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ABSTRACT

This paper addresses the question, "What teacher questioning behaviors influence student learning?" It synthesizes research findings, explicates their prescriptive implications, and presents behavioral guidelines for teachers who wish to make informed choices about improving classroom questioning behavior. The paper examines and synthesizes research findings that focus on the following questions: (1) Does question-asking improve student learning? (2) What types of questions are most effective in the classroom? (3) What questioning behaviors are related to increases in student learning? (4) What questioning behaviors interfere with student learning? The paper also offers a theoretically based questioning strategy designed to promote student learning and a discussion of future directions for research from a communication perspective. A figure for a questioning model is included; a 49-item bibliography is attached. (Author/SAM)

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TEACHER QUESTIONING BEHAVIOR AND STUDENT LEARNING: WHAT RESEARCH SAYS TO TEACHERS

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ABSTRACT

This paper addresses the question, "What teacher questioning behaviors influence student learning?" It synthesizes research findings, explicates their prescriptive implications, and presents behavioral guidelines for teachers who wish to make informed choices about improving classroom questioning behavior. The review focuses on research related to the following questions:

(1) Does question-asking improve student learning?

(2) What types of questions are most effective in the classroom?

(3) What questioning behaviors are related to increases in student learning?

(4) What questioning behaviors interfere with student learning?

The paper also offers a theoretically based questioning strategy designed to promote student learning and a discussion of future directions for research from a communication perspective.

> To question well is to teach well. In the skillful use of the question more than anything else lies the fine art of teaching; for in it we have the guide to clear and vivid ideas, the quick spur to imagination, the stimulus to thought, the incentive to action. (DeGarmo, 1911, p. 179)

Although written near the turn of the century, this quotation still conveys a timely message. Questioning is by far the most common communication behavior used in teaching. One study (Levin & Long, 1981) indicated that high school teachers ask as many as 300 to 400 questions a day. Another study (Dunkin & Biddle, 1974) found that teacher questions constitute one-sixth to one-tenth of all classroom interaction time. Teachers use questioning strategies to review, to check on learning, to probe thought processes, to pose problems, to seek out alternative solutions, and to challenge students to think critically and reflect on issues or values they have not previously considered. It is not surprising that questions have been labeled as "the single most influential teaching act" (Taba, Levine, & Elzey, 1964).

Interest in questioning techniques is not new. Indeed, one of the most enduring models of questioning dates back more than 2300 years to the time of Plato and Socrates and is still used in law schools today. Since the early 1900s, however, questioning techniques of teachers have been a major concern of researchers. The first 50 years of research focused on describing and evaluating teachers' use of questions in the classroom. During the next 20 years, sophisticated methods of systematic observation and analysis were developed to objectively identify

teacher questioning behaviors. Starting about 1970, researchers turned their attention toward identifying specific questioning behaviors that contribute to significant gains in student achievement. Generally referred to as process-product research, the findings provide useful clues about effective behaviors teachers can apply during the process of teaching to increase student learning.

This paper examines and synthesizes research findings that focus on the following questions:

(1) Does question-asking improve student learning?

(2) What types of questions are most effective in the classroom?

(3) What questioning behaviors are related to increases in student learning?

(4) What questioning behaviors interfere with student learning?

The paper also offers a theoretically based questioning strategy designed to promote student learning and concludes with a discussion of future directions for research from a communication perspective.

Review of Literature

Does question-asking improve student learning?

Although some studies have produced conflicting findings, research strongly supports teachers' assumptions that asking questions contributes to the effectiveness of their instruction.

Taken as a whole, studies conducted at all grade levels have indicated that both written and oral questions result in learning gains (Brophy & Good, 1986; Eddinger, 1985; Frase, 1967; Gall, Ward, Berliner, Cahen, Winne, Elashoff, & Stanton, 1978; Hargie, 1978; Wilen & Clegg, 1986).

Gall and Rhody (1987) summarized research efforts as to why questions lead to learning gains (Gall, 1984; Palincsar & Brown, 1984; Wittrock, 1981): They concluded:

1. Questions are motivating, and so they keep students on task.
2. Questions focus the student's attention on what is to be learned. A teacher's question is a cue to the student that information required to answer the question is important.
3. Questions, especially thought questions, elicit depth of processing. Rather than reading the text passively, a good question requires the student to process the text actively and transform it into terms meaningful to him or her.
4. Questions activate metacognitive processes. Thus, students become aware of how well they are mastering the curriculum content and whether they need to study it further.
5. Questions elicit further practice and rehearsal of the curriculum content.
6. If the student answers a question correctly, that is reinforcing, and the teacher may further reinforce the answer by praising or acknowledging it. If the student answers incorrectly, that can prompt the teacher to engage in reteaching.
7. Students' mastery of the curriculum is usually assessed by tests that consist of questions. Therefore, questions asked during instruction are consistent with the task requirement of tests. (p. 25-26)

What types of questions are most effective in the classroom?

The research does not indicate that one type of question is clearly better than another. Rather, each type of question is effective for a particular instructional goal. The challenge for

teachers, therefore, is to clarify instructional objectives for a particular lesson, analyze student ability levels, and then plan appropriate types of questions.

Several researchers have offered schemata for categorizing types of questions. Most notable are the systems developed by Sanders (1966), who applied Bloom's taxonomy (1956) of thought processes at various cognitive levels to question-asking behavior (i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation); Gallagher and Aschner (1963), who based their taxonomy on Guilford's model (1956) of convergent and divergent thinking processes; and Cunningham (1987), who combined previous efforts. The following description of question types is based on the Cunningham model.

Factual recall questions

This is the lowest cognitive level, but most frequently used type in classroom interaction. Questions at this level are easy to identify. Students may be asked to name, identify, recall, define, list, or distinguish. Because emphasis is on memorization and observation, student responses can easily be anticipated. Research has demonstrated that 90 percent of student responses will be correct. As to frequency of use in the classroom, research reviewers Gall (1984) and Wilen (1986) indicated that studies conducted during the past 70 years have consistently demonstrated that as many as 60 percent of all teacher questions require simple recall. Wilen attributed the narrow choice of questions used in instruction to the persistence

of the view of teaching as primarily imparting knowledge and learning by recalling and repeating as opposed to teaching students how to comprehend. Recall questions have been found to be effective in reviewing material, assessing comprehension, and determining student preparedness.

Example: What are the five steps in Monroe's motivated sequence?

Conceptual questions

Two types of questions are included in this category--convergent and divergent. Each type can be further subdivided into high and low levels. The difference between convergent and divergent questions can be illustrated by contrasting TV game shows with TV talk shows.

The fast-paced game show is built upon the convergent questioning strategy. Only a single, correct answer will win the prize or allow the contestant to go on to the next round. Though glamorous and expensive prizes are certainly attractive lures, there may be other reasons for the popularity of this strategy. Consider, for example, the popularity of the many versions of Trivial Pursuit, spelling bees, and the high school team activity "Academic Challenge" and "Match-Wits." Interest runs high and can easily be sustained for an entire semester.

By way of contrast, talk show hosts Phil Donahue and Oprah Winfrey use open-ended, divergent thinking questions, skillfully bringing out new knowledge or unorthodox viewpoints about the topic under discussion. Often talk show hosts quickly contrast that information with positions previously stated by the panel of

experts or the audience. The audience may be spellbound for an hour. There are no rewards or points scored, no frenzied buildup to the grand prize, no passing or failing grades. Yet talk shows, like game shows, enjoy enormous popularity and high ratings.

Convergent questions. **Low-convergent questions call for recognition or transformation of information**, but in a predictable way. They are concerned with "right" answers and are characteristic of those used in textbook materials. Overuse of this type of question, without attention to other kinds, has been found to hinder student development (Cunningham, 1987). Typically, low-convergent questions ask students to compare, contrast, generalize, transfer, identify trends, and explain relationships. Questions at this level determine whether or not a student is able to recognize and organize facts and ideas using information provided in the content under consideration.

> Example: How would you use the guidelines provided in the reading assignment on listening to increase your listening abilities in this class?

High-convergent questions require that students reason. Consequently, they are important for critical thinking. Students respond to these questions by looking for evidence to support, giving reasons for behaviors or outcomes, and drawing conclusions. Ideas, situations, or events may be broken down into components. As they examine these elements, students look for motives for behaviors, unstated assumptions, cause and effect, and the relationships of elements to a total

organizational scheme. High-convergent questions are used as probes to get students to extend their thinking by supporting assertions.

> Example: What are the central problems in the "Carson Products' Management Team Disaster" case? How did you come to that conclusion?

Divergent questions. Responses to divergent questions are less predictable. Often they are unknown or not expected by the questioner. In response to divergent questions, students may develop a plan of attack for a problem, propose solutions, create a product, speculate about possible outcomes, or hypothesize from prior analyses. Responses will likely take time to develop.

Low-divergent questions ask students to think of alternate ways to do something. Typically, teachers use low-divergent questions as the first step in the problem-solving process or in a sequence of questions where students brainstorm possible solutions.

> Example: What are some ways to organize this information for the upcoming group presentation?

High-divergent questions encourage creative thinking. These questions have students formulate generalizations and give diverse, original, or novel responses. Research has shown that only 5 percent of the questions used in classrooms are of this type (Cunningham, 1987). Further, research has indicated that in order for students to benefit from high-level divergent questions, they need the freedom to generate unique, new, or imaginative ideas. Thus, an atmosphere where there is opportunity to explore a variety of ideas without constraints or

press to give "correct" answers is required (Sund & Carin, 1978). Students may be required to elaborate, make divergent associations, point out implications, or do open predicting.

> Example: What kind of intervention plan can you suggest for the "More Technology, More Complaints" case? What do you predict will happen if nothing is done?

Evaluative questions

This level in its most complex form is a blend of all other levels. However, an evaluative question can be as simple as a factual question, for even at the factual level students **make value judgements about information or methods.** When students respond to evaluative questions, they may express opinions, judge validity and merits of an idea or solution, select against a set of values, make discriminations, take a self-selected position on an issue, or evaluate the quality of a product. The quality that places this type of question in the higher order is the potential for probing the student to support his/her response.

> Examples: Do you agree or disagree that competition in groups has more negative than positive effects? Support your answer.
>
> Which leadership style best characterizes your philosophy of leadership? Why?

Appropriate use of all types of questions offers a means of guiding students' progress in the learning process. In too many classrooms, the kinds of questions used have been limited to very few types (Sund & Carin, 1978). In fact, studies (Gall, 1984; Hare & Pullman, 1980) have demonstrated that 80 percent of questions used in classrooms ask students to do something other than think (60 percent require recall; 20 percent are

procedural). Thus, although theory strongly suggests that teachers should ask high-level questions, practice consistently demonstrates that teachers ask low-level questions. Further, if a teacher uses the same type of questions for all students and all circumstances, productive interaction is unlikely. Therefore, purposeful decisions need to be made about the kinds of questions to ask. These choices must be guided both by the abilities of the students and the purposes to be accomplished in instruction.

What questioning behaviors are related to increases in student learning?

Research conducted during the past 20 years has provided useful clues about questioning behaviors and techniques that contribute to learning gains. The following effective questioning behaviors were identified by Wilen (1987) as a result of his careful synthesis of four primary reviews of teaching literature conducted by Brophy and Good (1986), Berliner (1984), Weil and Murphy (1982), and Levin and Long (1981).

To increase student learning, teachers should:

1. **Phrase questions clearly.** If students are miscued by an ambiguous question, the probability of confusion increases. If questions are frequently ambiguous, then frustration, withdrawal, and resentment develop. Clearly phrased questions communicate to the student the response expectation. Therefore, higher-cognitive-level questions need to be carefully planned,

sequenced, and written into lesson plans prior to class. Spontaneous questions should be based on student responses.

2. **Ask questions of primarily an academic nature.** Academic questions relate to subject matter. Nonacademic questions are generally affective or procedurally oriented. While nonacademic questions play an important role in contributing to the social-emotional climate, they have not been found to increase student achievement.

3. **Ask frequent factual recall questions in elementary settings.** Repetition coupled with immediate feedback is a proven combination in strengthening students' cognitive recall skills (Gall, 1984). However, teachers must beware that disproportionate use of low-level questions may result in a mind-set where recall becomes an end in itself rather than serving to stimulate higher-level thinking about an issue or problem.

4. **Ask high-cognitive-level questions with students who have reached puberty and, therefore, have the ability to engage in abstract thinking** (Piaget, 1955; Vygotsky, 1986). Research generally has supported a positive relationship between higher-level questions and student achievement gains. Additionally, concerning cognitive-level congruency between questions and student responses, research findings have been mixed, with most studies indicating a significant positive relationship between question and response level (Arnold, Atwood, & Rogers, 1973; Gallagher, 1965; Gallagher & Aschner, 1963; Taba, 1964). Some studies, however, have demonstrated only about a 50 percent

agreement between the level of teacher questions and student responses (Dillon, 1982; Mills et al., 1980). A possible explanation was offered by Winne and Marx (1979), whose research suggested that students' perceptions and teachers' intentions differ when lack of congruence exists. Thus, taken as a whole, it is logical that if teachers of older students expect to increase the probability that their students will engage in higher-level thinking, questions must be planned and response expectations communicated at higher levels.

5. Give students time to think when responding. Increase wait time three to five seconds after asking a high-level question and prior to initiation of a student response. Unfortunately, research has demonstrated that teachers typically wait 1 second or less (Rowe, 1974). Rowe (1986) reviewed literature concerning wait time and identified the following advantages to increasing wait time to 3 seconds or more:

1. The length of student responses increases between 300 percent and 700 percent.
2. More inferences are supported by evidence and logical argument.
3. The incidence of speculative thinking increases.
4. The number of questions asked by students increases, and, in the case of science, the number of experiments they propose increases.
5. Student-student exchanges increase; teacher-centered behavior decreases.
6. Failures to respond decrease.
7. Disciplinary moves decrease.
8. The variety of students participating voluntarily in discussions increases. Also, the number of unsolicited, but appropriate, contributions by students increases.
9. Student confidence, as reflected in fewer inflected responses, increases.
10. Achievement improves on cognitively complex written measures. (p. 97)

6. Use questions that encourage wide student participation. Distribute questions to involve the majority of students. Balance responses from volunteers and nonvolunteers, using discretion regarding the difficulty level of questions. Encourage student-to-student interaction. A recent study (Wood & Wood, 1987) found that teachers exerted considerable control in discussions through their questions. As a result, students' freedom to participate was stifled. Encouraging student-student interaction by involving a balance of volunteering and nonvolunteering students resulted in a shift of focus from the teacher to the student. Wood and Wood concluded that the discussion process contributes to student "ownership" of the learning activity.

7. Probe student responses in a nonjudgmental way. Have students clarify an idea, support a point of view, or extend their thinking. Assist with incorrect responses.

8. Acknowledge correct responses from students and use praise specifically and discriminately. Simple acknowledgments and other forms of encouragement can often be used in place of praise to communicate acceptance to students of their contributions. The most powerful pattern of praise behavior is that which communicates both praise and the reason for the praise.

What questioning behaviors interfere with student learning?

Just as specific communication behaviors have been identified that increase student achievement, questioning behaviors that interfere with student learning have also been

isolated. Although not specifically labeled as such, behaviors that contribute to a defensive classroom climate, as opposed to a supportive climate, have been found to be detrimental to student learning. Defensive climates are characterized by evaluation, control, strategy (involving ambiguous and multiple motivations), neutrality or lack of real concern for individual worth of participants, superiority, and certainty (dogmatism). Contrastingly, supportive climates are characterized by use of descriptive speech, taking a problem orientation, spontaneity, empathy, equality, and willingness to investigate issues rather than take sides (Gibb, 1961).

Specifically, the following questioning behaviors have been found to hinder learning. Not only do these communication patterns interfere with wait time, but they also convey unwanted implicit messages to students.

1. Commands given before the minimum three seconds of wait time. Commands such as "Think! Think hard!" often reflect the exasperation of an anxious teacher and are of little use to the student. In fact, the look on the student's face may reply, "I did think, but I didn't think like you did. How do I think? Teach me." Perhaps the student is simply signaling to the teacher that his/her question is not phrased clearly, is too difficult or too easy for the student's ability, or that the type of question is inappropriate for the occasion. Vague questions force students to guess what the teacher wants, rather than to use time productively to think of a response.

2. **Mimicry.** Repeating some or all of a student's answer not only interferes with wait time and the elaboration of ideas, but also carries at least two implicit messages to students: (1) there is no payoff for listening to each other or trying to evaluate what other students say since the tone of the teacher will tell which answers are acceptable and which are not; (2) the teacher is not only in control of behavior, but of ideas as well (Rowe, 1987).

3. **"Yes, but. . ." constructions.** Found to be particularly significant at the adult level, "yes, but . . ." constructions imply impending rejection or negation of an idea without sufficient consideration (Rowe, 1987). Such constructions signal that the teacher does not receive and explore new ideas. Rather, he/she is bent on countering them.

4. **Communication patterns that attempt to produce intellectual compliance.** Phrases such as "Isn't it?" and "Right?" make it difficult for students to voice a contrary opinion. A better phrase for "Don't you think that . . .?" might be, "What do you think?"

6. **Acceptance of incorrect answers and/or failure to assist students in correcting responses.**

7. **Situations of high anxiety, such as giving a grade for each answer.**

By way of summary, frequency and appropriateness of question-asking in the classroom result in increases in student learning. Although there are several types of questions, no one

particular type is best for all situations. Rather, learning results when a supportive classroom environment exists and teachers follow a contingency approach, planning and using questions appropriate for instructional goals and students' abilities. Specific questioning behaviors that contribute to achievement gains for older students are: effective use of wait time, clear phrasing, use of high-cognitive-level academic questions, probing behavior, balancing of volunteer-nonvolunteer responses, and acknowledgement and/or praise of responses. Questioning behaviors that are detrimental to learning are often authoritative communication patterns or constructions typical of a defensive classroom climate.

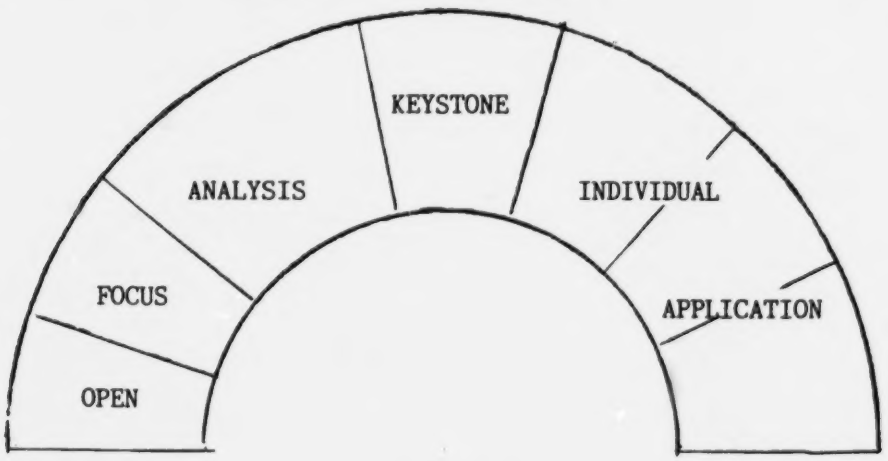
OFAKA: A Questioning Strategy for Value-Centered Teaching

The OFAKA questioning strategy derives its name from the sequence and type of questions used--**Open, Focus, Analysis, Keystone, Application.** The model grew out of the ongoing need to develop multiple ways to influence the quality and direction of student thinking. OFAKA provides a strategy or sequence of steps teachers can use to help students think critically, clarify personal values, and identify application opportunities.

OFAKA is theoretically based on (1) Bloom's well-known taxonomy of thought processes (1956)--knowledge, comprehension, application, analysis, synthesis, and evaluation; (2) the Guilford model (1956) of convergent and divergent thinking processes; and (3) Taba, Levine, and Elzey's system (1964) for

collecting, interpreting, analyzing, and generalizing gathered data. Inherent in the model, as in Bloom's taxonomy, is the advantage that higher level questions subsume lower level questions. Thus questions at the keystone level not only guide students at the evaluative level, but also challenge students to function at lower levels.

Figure 1: The OFAKA Questioning Model



Following is an explanation of the five components of the OFAKA questioning model:

OPEN: **provides a database from which the students extract concepts and generalizations and/or the teacher assesses student needs and previous knowledge.**

Example: As you think about the use of questions in the classroom, what comes to your mind?

FOCUS: **directs students' attention to specific concepts to be emphasized.**

Example: What are the advantages of using questions in the classroom?

Focus questions often help to establish the need for the information. Frequently they are answered by student contributions augmented by mini-lectures on the topic of the day.

ANALYSIS: **breaks the concepts into parts in order to compare, contrast, and examine connections, interactions, and relationships among parts.**

> Example: How can teachers use questions effectively to stimulate critical thinking and foster student value clarification?

Most often the analysis component of OFAKA contains the bulk of lesson material. Discussions, small group work, mini-lectures, role-play exercises, simulations, or other teaching tools can be incorporated into this segment as appropriate to the topic, the teaching style of the instructor, and the various learning styles of the students.

KEYSTONE: **calls for evaluative thinking and personal value clarification.**

> Example: In your opinion, what are the two most important points to remember about questioning behavior? Write down your answer.

The keystone question moves the student into the highest level of critical thinking. Just as the keystone of an arch locks the other pieces in place, so, too, does the keystone question provide the support needed to sustain long-term learning. The goal of keystone questions is to facilitate

evaluation and student identification of that which is important to him/her in regard to the lesson material, thus setting the stage for behavior and/or attitude change.

APPLICATION: calls for students to think and commit to specific ways to apply in real life that which they have identified as important.

Example: How can you apply at least one of the important points you just identified to the next lesson you teach? Write down your answer.

When used in combination with effective questioning behaviors, the OFAKA questioning strategy offers the following advantages:

(1) Provides an organizational framework for lesson planning when critical thinking and/or value clarification are instructional goals.

(2) Facilitates easy adaptation of lesson material to a particular audience.

(3) Allows the teacher to personalize lesson material to fit his/her desires and teaching style.

(4) Develops critical thinking skills.

(5) Fosters student ownership of the responsibility for student learning.

(6) Promotes student ownership of curriculum content.

(7) Provides an instructional system by which students and teachers can organize their thinking.

(8) Encourages freedom of interaction among students and with the teacher, thus promoting creative thinking and meaningful discussion.

(9) Provides an opportunity for informal diagnosis by the teacher, thereby creating a basis from which to plan future instructional sessions.

(10) Is adaptable and appropriate for many age levels, types of audiences, and varying class sizes.

(11) Is easy to remember and use, thus providing a way for teachers to quickly plan meaningful, result-oriented, and interesting lessons.

Overall, the OFAKA questioning strategy strives to meet the needs of the wide variety of teachers who may use it and provides an organized sequence for teachers to follow as they work toward achievement of higher level thinking, value clarification, and increased learning in their classrooms.

Future Directions

Although teachers' questioning behaviors have been studied widely for many years, much is still not known about how to use questions to facilitate learning, particularly from a communication perspective. A thorough study of question-asking literature invites many questions and avenues for research:

* What is the impact of questions and questioning techniques on different segments of the student population? For example, is extensive use of teacher questions beneficial or detrimental for

highly apprehensive students? What are the effects of frequency and types of teacher questions on students of various ability levels, ethnic origins, age?

* Although research has demonstrated that balancing of volunteer and nonvolunteer responses results in increased student achievement, what is the effect of teachers' regular solicitation of nonvolunteers on student satisfaction and/or classroom apprehension? Further, does the regular solicitation of nonvolunteer responses result in learning gains for highly apprehensive students?

* Does the high percentage of low-cognitive-level and/or recall questions continue in post-high school settings?

* At the college level, does a threshold exist regarding frequency of questions, after which learning is adversely affected or time wasted?

* Is there a relationship between teacher use of restrictors and student learning, creativity, and/or classroom apprehension? (i.e.,"What should the solution be?" as opposed to "What would your solution be?" Restrictor is omission of "your" and substitution of "should" for "would." Another example: "What do you think the central problems are?" as opposed to "What are the three central problems in this case?")

* What is the relationship between frequency of redirection of student questions (asking the class for the answer as opposed to immediate teacher response) and student satisfaction?

* What are the relationships among instructor questioning behavior, student arousal, and motivation?

* What is the relationship between control needs of the instructor and his/her questioning techniques?

* What are the relationships among tolerance for disagreement in the classroom, teacher questioning behaviors, student satisfaction, and/or learning?

* What is the relationship between self-perceived teacher competence and frequency of high-cognitive-level divergent and convergent questions?

* Are teachers able to accurately monitor their own questioning behavior? Does congruency exist between teachers' self-perceived questioning behavior and their actual questioning behavior?

* What effect does class size have upon the effectiveness of various questioning behaviors?

* What is the role of student questioning? Many content areas, such as communication, place a high premium on group discussion, but there appears to be a dearth of studies that examine questioning behavior in discussion as related to high levels of independent thinking, critical analyses of previous students' statements, creative approaches to new issues, or divergent solutions to problems.

Overall, much research needs to be done to clarify the role of questioning behaviors in educational settings. From a pedagogical viewpoint, answers to the above research questions

may provide useful clues as to how to increase teacher effectiveness in promoting student learning, thus helping inquiring teachers make informed choices as they pursue their various paths toward meeting instructional goals.

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